

2.11 Coping capacity

Coping Capacity – *The means by which people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster. (In general, this involves managing resources, both in normal times as well as during crises or adverse conditions. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and human-induced hazards.)* (UN/ISDR, 2004)

Coping capacity – *Capacity refers to the manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process. The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards* (European Spatial Planning Observation Network)

Although the term ‘coping capacity’ is widely used in the context of the UNFCCC, it is not officially defined.

UN/ISDR definition applies the term only to social systems, i.e. people and organizations as it does in its definition of ‘capacity’.

Coping and adaptive capacity can mean the same thing if both concepts imply natural ability of a system to adjust to climate change. In this interpretation, adaptation measures and adaptation in general will increase this ability. However, if adaptive capacity implies the extent to which the system is capable of adapting, these two concepts are different. Coping capacity can be increased with adaptation measures while adaptive capacity already includes coping capacity plus possible adaptation measures and cannot be increased beyond a certain point.

The way most literature uses these two terms suggest that ‘coping capacity’ and ‘adaptive capacity’ mean essentially the same thing.

Peltonen (2005) makes a subtle distinction between coping and adaptive capacities, he states that “successful adaptation to climate change and sea-level rise depends greatly on coping capacity or adaptive capacity, that is, the ability of an affected (human or natural) system, region, or community to cope with or adapt to the impacts and risks of climate change induced sea-level rise. While the concept of coping capacity is more directly related to an extreme event (e.g. a flood or a winter storm), the concept of adaptive capacity refers to a longer time frame and implies that some learning either before or after an extreme event is happening”.

2.12 Coping range

Coping range – *The variation in climatic stimuli that a system can absorb without producing significant impacts.* (IPCC TAR, 2001 a)

Coping range – *Is the range of climate where the outcomes are beneficial or negative but tolerable; beyond the coping range, the damages or loss are no longer tolerable and a society (or a system) is said to be vulnerable.* (UNDP, 2005)

Coping range – *The range of variability described by a climate variable, climate-related variable or proxy climate variable whose consequences or outputs can be measured in terms of tolerable levels of harm or risk. The exceedence of the coping range is expected to result in harm.* (UKCIP, 2003)

The emphasis of this definition is on the range of climate that can be coped with.

2.13 Critical threshold

Critical threshold – *The point at which an activity faces an unacceptable level of harm, such as a change from profit to loss on a farm due to decreased water availability, or coastal flooding exceeding present planning limits. It occurs when a threshold q.v. is reached at which ecological or socioeconomic change is damaging and requires a policy response. (Australian Greenhouse Office. 2003)*

Threshold – *Any level of a property of a natural or socioeconomic system beyond which a defined or marked change occurs. Gradual climate change may force a system beyond such a threshold. Biophysical thresholds represent a distinct change in conditions, such as the drying of a wetland, floods, breeding events. Climatic thresholds include frost, snow and monsoon onset. Ecological thresholds include breeding events, local to global extinction or the removal of specific conditions for survival. Socioeconomic thresholds are set by benchmarking a level of performance. Exceeding a socioeconomic threshold results in a change of legal, regulatory, economic or cultural behaviour. Examples of agricultural thresholds include the yield per unit area of a crop in weight, volume or gross income. (Australian Greenhouse Office. 2003)*

Threshold – *A property of a system or a response function, where the relationship between the input variable and an output or other variable changes suddenly. It can be important to identify thresholds, and other non-linear relationships, as these may indicate rapid changes in risk. (UKCIP Technical Report. 2003. Climate Adaptation: Risk, uncertainty and decision-making.)*

Thresholds apparently define the boundaries of coping ranges. Some other literature (e.g., Nicholls, 2006) also uses the term ‘tipping points’ that imply physically-based thresholds such as the amount of sea-level rise or intensity and frequency of storms or length of a drought, etc. which will necessitate a major response decision or action. An important area for future research would be the role of adaptive capacity in defining and moving thresholds.

There is one important difference between the Australian and UK definitions: the latter stresses a “sudden” change in the system’s balance, while the former does not include any time-related determinants. The example, provided in the Australian definition of ‘critical threshold’, of a farm that experiences a change from profit to loss due to decreased water availability may or may not imply a sudden change.

2.14 Disaster

A Disaster – *Is a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. (UN/ISDR, 2004)*

It is interesting to note that the definition incorporates the notion of external assistance. This suggests that recovery from a dramatic event (e.g., flood, heat wave) with only internal resources is not a disaster.

2.15 Extreme weather event

Extreme weather event – *An event that is rare within its statistical reference distribution at a particular place. Definitions of "rare" vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. By definition, the characteristics of what is called "extreme weather" may vary from place to place. An "extreme climate event" is an average of a number of weather events over a certain period of time, an average which is itself extreme (e.g., rainfall over a season). (IPCC, TAR, 2001 a)*

Extreme event – *An extreme weather event refers to meteorological conditions that are rare for a particular place and/or time, such as an intense storm or heat wave. An extreme climate event is an*

unusual average over time of a number of weather events, for example heavy rainfall over a season. (Australian Greenhouse Office. 2003)

2.16 Mainstreaming

A definition of ‘mainstreaming’ does not yet exist, although the term is widely used. It seems that ‘mainstreaming’ is used interchangeably with ‘integration’. Mainstreaming refers to the integration of adaptation objectives, strategies, policies, measures or operations such that they become part of the national and regional development policies, processes and budgets at all levels and stages (UNDP, 2005). The term is also used to describe the process of integrating adaptation to climate change into development assistance (e.g., Agrawala (2005), Klein (2002)). Although some broader or narrower interpretations are possible, the term is often associated with the process of taking into consideration potential climate change impacts when making investment or development assistance decisions.

2.17 Resilience

Resilience – *Amount of change a system can undergo without changing state.* (IPCC, TAR, 2001)

Resilience – *Resilience is a tendency to maintain integrity when subject to disturbance.* (UNDP, 2005)

Resilience – *The ability of a system to recover from the effect of an extreme load that may have caused harm.* (UKCIP, 2003)

Resilience – *The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.* (UN/ISDR, 2004)

Resilience – *Refers to three conditions that enable social or ecological systems to bounce back after a shock. The conditions are: ability to self-organize, ability to buffer disturbance and capacity for learning and adapting* (Tompkins E. et al. 2005)

There is an important difference in the definitions of resilience provided by the IPCC, UNDP and UN/ISDR on the one hand and the UKCIP on the other. The former institutions define resilience as the capacity of a system to tolerate disturbance without changing state; the UKCIP defines resilience as the ability to recover from the effect. These interpretations are different because in the first case resilience implies the ability not to sustain damage while in the latter interpretation resilience implies that the damage can occur and the system will be able to recover from it.

For example, there are two distinct ways to characterise resilience of a hypothetical village in the coastal zone by applying two different interpretations of ‘resilience’. If we use the first interpretation to tell that the village is resilient to storms we probably imply that there is a protection system in place and/or no construction in a sensitive zone to be damaged. If we use the second interpretation, we might imply that there is some construction in the sensitive zone that can be damaged but it is not significant for the functioning of this village, so even if it is damaged, the village can recover from it, thus it is resilient.

The importance of this distinction is in the application of the term ‘resilience’ and attempts to measure it or measure approaches that increase resilience. Are we talking about adaptation that increases the system’s resilience in a sense that no damage or very insignificant damage can occur? Or are we talking about adaptation that increases our ability to recover from the damage?

Klein et. al. (2004) reviewed the literature relating to the concept of resilience. They concluded that resilience is best used to define two specific system attributes:

- The amount of disturbance a system can absorb and still remain within the same state or domain of attraction;
- The degree to which the system is capable of self-organisation.

It is also important to clearly define the relationship between ‘resilience’, ‘vulnerability’, ‘adaptive capacity’, ‘coping capacity’ and ‘coping range’ to make these terms practically applicable. In the IPCC definition of resilience, this term seems to be closely related to “coping range”, since the emphasis of the definition is on the amount of change that the system can tolerate. Other definitions emphasise the ‘ability’ of a system, so its “coping and/or adaptive capacity” to tolerate change. Some scholars have analysed the applicability of the concept of resilience on practice and proposed to use “adaptive capacity as the umbrella concept that includes the ability to prepare and plan for hazards, as well as to implement technical measures before, during and after a hard event... the resilience be regarded as one property that influences adaptive capacity.”(Klein et. al, 2004) ‘Vulnerability’ seems largely to imply an inability to cope and ‘resilience’ seems to broadly imply an ability to cope. They may be viewed as two ends of a spectrum.

2.18 Sensitivity

Sensitivity – *Is the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise) (IPCC TAR, 2001)*

Sensitivity – *The degree to which a system is affected, either adversely or beneficially, by climate related stimuli, including mean (i.e., average) climate characteristics, climate variability and the frequency and magnitude of extremes (Australian Greenhouse Office. 2003)*

Sensitivity – *Affects the magnitude and/or rate of a climate related perturbation or stress (while vulnerability is the degree to which a system is susceptible to harm from that perturbation or stress). (UNDP, 2005)*

The UKCIP uses the IPCC definition and adds: **Sensitivity** *refers to the change that results (in a system or variable) from a specific perturbation in an input value, parameter value, or other assumption.*

2.19 Vulnerability

Vulnerability – *The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. (IPCC TAR, 2001)¹³*

UNDP distinguishes **Socio-economic vulnerability** – *Is an aggregate measure of human welfare that integrates environmental, social, economic and political exposure to a range of harmful perturbations. And **Vulnerability** – the degree to which the exposure unit is susceptible to harm due to exposure to a perturbation or stress, and the ability (or lack thereof) of the exposure unit to cope, recover, or fundamentally adapt (become a new system or become extinct) (Kasperson et al., 2000) It can also be considered as the underlying exposure to damaging shocks, perturbation or stress, rather than the probability or projected incidence of those shocks themselves. (UNDP, 2005)*

¹³ This definition contains a minor error: instead of “...susceptible to, or unable to cope with...” it should say “...susceptible to, and unable to cope with...”

Vulnerability – *The extent to which a natural system or human society is unable to cope with the negative impacts of climate change, variability and extremes. It depends on changes in climate as well as the sensitivity and adaptive capacity of the system or society.* (Australian Greenhouse Office, 2003)

Vulnerability – *Refers to the magnitude of harm that would result from a particular hazardous event. The concept recognises, for example, that different sub-types of a receptor may differ in their sensitivity to a particular level of hazard. Therefore climate vulnerability defines the extent to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. It depends not only on a system’s sensitivity but also on its adaptive capacity. Hence arctic alpine flora or the elderly may be more vulnerable to climate change than other components of our flora or population.* (UKCIP, 2003)

Vulnerability – *The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. (For positive factors, which increase the ability of people to cope with hazards, see definition of capacity.)* (UN/ISDR, 2004)

Vulnerability – *The degree to which an individual, group or system is susceptible to harm due to exposure to a hazard or stress, and the (in)ability to cope, recover, or fundamentally adapt (become a new system or become extinct).* (Tompkins, E., 2005)

The term ‘vulnerability’ is one of the key concepts in the adaptation research. It is widely used and also widely evaluated in terms of its applicability, use and interpretations. Some scholars (O’Brien, K. et al., 2004) discuss two competing interpretations of vulnerability in the climate change literature. This discussion claims that one interpretation views vulnerability as a residual of climate change impacts minus adaptation, and that the second interpretation views vulnerability as a general characteristic or state generated by multiple factors and processes, but exacerbated by climate change.

The definitions of vulnerability collected in this paper have some common features. All of the definitions listed above define vulnerability as the degree, extent or magnitude to which the system is susceptible to harm/adverse effects of climate change. All these definitions also state that vulnerability depends on a system’s sensitivity and its adaptive capacity.

The first interpretation of vulnerability as residual (‘end point’) can be explained by an alternative interpretation of ‘adaptive capacity’ as the extent of adaptation. If adaptive capacity is viewed as the limit of adaptation; then vulnerability can be viewed as a residual from climate impact minus adaptation, since beyond the limit of adaptive capacity nothing else can be done – true vulnerability. However, in most cases vulnerability is interpreted as a starting point that can be reduced by adaptation. It probably means that most scholars and policy makers interpret adaptive capacity as ability to adapt that is not constant in time and not as a limit of adaptation. So, adaptation can enhance/increase adaptive capacity and reduce vulnerability. “Successful adaptation reduces vulnerability to an extent that depends greatly on adaptive capacity - the ability of an affected system, region, or community to cope with the impacts and risks of climate change. Enhancement of adaptive capacity can reduce vulnerability”. (IPCC TAR, 2001)

2.20 Vulnerability assessment

Vulnerability assessment *identifies who and what is exposed and sensitive to change. A vulnerability assessment starts by considering the factors that make people or the environment susceptible to harm, i.e. access to natural and financial resources; ability to self-protect; support networks and so on.* (Tompkins, E. et al., 2005)

3. Other Adaptation-related Terms

This section presents other terms and definitions that are listed in IPCC reports, UNFCCC documents and other literature. They are either less controversial or do not have a wide range of definitions and were considered to be of less importance for this paper. The paper does not analyse these terms and presents them here for completeness. The paper does not attempt to collect all terms that are used in the adaptation context.

3.1 Adaptation policy framework

Adaptation Policy Framework – Is a structural process for developing adaptation strategies, policies, and measures to enhance and ensure human development in the face of climate change, including climate variability. The APF is designed to link climate change adaptation to sustainable development and other global environmental issues. It consists of five basic Components: scoping and designing an adaptation project, assessing current vulnerability, characterizing future climate risks, developing an adaptation strategy, and continuing the adaptation process. (UNDP, 2005)

3.2 Types of Adaptation

The IPCC distinguishes several types of adaptation (IPCC TAR, 2001):

- **Anticipatory Adaptation**—Adaptation that takes place before impacts of climate change are observed. Also referred to as proactive adaptation.
- **Autonomous Adaptation**—Adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. Also referred to as spontaneous adaptation.
- **Planned Adaptation**—Adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.
- **Private Adaptation**—Adaptation that is initiated and implemented by individuals, households or private companies. Private adaptation is usually in the actor's rational self-interest.
- **Public Adaptation**—Adaptation that is initiated and implemented by governments at all levels. Public adaptation is usually directed at collective needs.
- **Reactive Adaptation**—Adaptation that takes place after impacts of climate change have been observed.

3.3 Adaptation deficit

Definition was offered by Ian Burton at the In-session workshop on adaptation (May 21, 2005, Bonn): *Failure to adapt adequately to existing climate risks largely accounts for the adaptation deficit.*

3.4 Adverse effects

The UNFCCC Convention defines “**adverse effects of climate change**” as “*changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the*